

A COMPARISON OF SEVERAL HORMONE FORMULATIONS FOR ROOTING CUTTINGS

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Abstract. Three rooting hormone products: liquids, Dip n' Grow, and Wood's Rooting Compound, and the powder, Hormex No. 8, were compared for rooting efficacy on eight species during December. Results varied by species, but in more cases, a heavier root system was produced by the liquid products. The solvent system was changed on Dip n' Grow by the manufacturer and a new trial was conducted in May with two species using the new formulation. There were no significant differences with *Forsythia* × *intermedia* 'Spring Glory', but Wood's Rooting Compound appeared to be more effective at lower concentrations with *Viburnum* × *burkwoodii*.

There have been many reports over the years in I.P.P.S. publications on the use of Dip n' Grow and Speedy Dip No. 2, an earlier name for the same formulation. Dip n' Grow was a liquid formulation containing 20 percent dimethyl sulfoxide as part of the solvents but was never registered with the E.P.A. for sales throughout the U.S. It was offered for sale in the states of Oregon and Washington under State 24 c registrations. In 1980 a new product, Wood's Rooting Compound, which contained approximately the same amounts of indolebutyric acid (IBA) and naphthaleneacetic acid (NAA) with 20 percent dimethyl formamide as part of the solvents, received an E.P.A. label for national sales.

The formulation of Dip n' Grow was changed during 1981 and now has an E.P.A. label for sale in all states. The label on the new formulation does not show DMSO, Dichlone, or boron, which were in the original product.

MATERIALS AND METHODS

Winter Trial. Three hormone products and an untreated control were used to promote rooting of eight species in trials started during December 1980. Dip n' Grow was composed of dimethyl sulfoxide (DMSO) 20%, IBA 1.0%, NAA 0.5%, Dichlone (2,3-dichloro-1-4 naphthoquinone) 0.1%, and boric acid 0.017%, and 78.38% inert ingredients. Hormex No. 8 contains 0.8% IBA in talc. Wood's Rooting Compound contains IBA 1.03%, NAA 0.51%, ethanol DS 3A 78.546%, and dimethyl formamide 20.0%.

Test plants and the number of 10 cutting replications used were: *Buxus sempervirens* 'Suffruticosa' (6), *Euonymus fortunei* 'Gracilis' (Syn. *variegata*) (6), *Juniperus horizontalis* 'Wiltonii' (6), *Ligustrum japonicum* (10), and *Viburnum davidii* (10). All treatments were randomized in 3 inch deep perlite filled flats

which were maintained at 72°F by electric cables. Mist frequency was determined by a Mist-A-Matic control.

Summer Trial. The formulation of Dip n' Grow was changed during 1981 and it has received a national E.P.A. label. The IBA and NAA levels remain the same but DMSO, Dichlone, and boron are no longer listed as contents. Softwood cuttings of *Forsythia* × *intermedia* 'Spring Glory' and *Viburnum* × *burkwoodii* were treated on May 14 and May 13 respectively with the new formulation at 1 in 10, 20, and 40 dilutions, the old formulation at 1 in 20, Wood's Rooting Compound at 1 in 10, 20, and 40 dilutions, Hormodin No. 2 (0.3 percent IBA in talc), and an untreated control.

The cuttings were lifted and evaluated when the majority of cuttings of a species had root systems large enough to insure survival. Evaluation was on the basis of heavy, medium, and light rooting with standards that varied somewhat with the type of root systems produced by the species. Results are presented both as total percentage rooting and by a rooting value system. A value of 3 was assigned to a heavily, 2 to a medium, and 1 to a lightly rooted cutting. The total of the number of cuttings in a category was multiplied by the assigned value and the sum for a replication was used for statistical analysis.

RESULTS

In the winter trial, rooting values indicated that *Buxus sempervirens* 'Suffruticosa', *Ligustrum japonicum*, and *Pinus mugo* were not benefited by the application of a rooting hormone. It is likely that the 1 in 5 dilution of the liquid hormone products was too strong for these species.

Euonymus fortunei 'Gracilis', *Juniperus horizontalis* 'Wiltonii', *Photinia* × *fraseri*, *Thuja occidentalis* 'Fastigiata' and *Viburnum davidii* did respond to one or more of the hormone treatments. Generally, rooting values were higher with either of the liquid products than with the powder formulation. Rooting results with *Photinia* were not statistically significant because of variations among replications but did show a response to hormones.

In the summer trial, some drying of the *Forsythia* cuttings occurred, causing variations among replications. Differences in rooting during the 19 days of this trial were not great with the exception of the Dip n' Grow, 1 in 20 dilution, which were unexplainably depressed.

There were significant differences among treatments with *Viburnum* × *burkwoodii*. Only the highest concentration of the new formulation of Dip n' Grow was superior to the con-

trol while all dilutions of Wood's Rooting Compound were superior. The 1 in 20 dilution of the old formulation was also effective. Again the rooting results of the 1 in 20 dilution of the new formulation on *V. × burkwoodii* appear to be out of line.

More trials will be necessary to determine whether the dilutions of Dip n' Grow mentioned in numerous reports in IPPS publications can be used without modification with the new formulation. Wood's Rooting Compound appears to be effective at very dilute rates and this should be considered when trying this product.

Table 1. Effect of three hormone products on rooting cuttings of eight ornamental species.

Species, Rooting Period, and Number of Replications()	Treatment	Percent of Cuttings Rooted	Average Rooting Value*	
<i>Buxus sempervirens</i> 'Suffruticosa' 12/3/80 - 2/12/81 (6)	Control	81.7%	14.0	N.S.**
	***Dip N'Grow 1 in 5	78.3	15.2	N.S.
	Hormex 8	73.3	10.8	N.S.
	Woods R.C. 1 in 5	80.0	13.3	N.S.
<i>Euonymus fortunei</i> 'Gracilis' 12/3/80 - 4/27/81 (6)	Control	63.3	7.7 a	
	Dip N'Grow 1 in 5	100.0	18.5 b	
	Hormex	90.0	14.5 b	
	Woods R.C. 1 in 5	96.9	19.5 b	
<i>Juniperus horizontalis</i> 'Wiltonii' 12/9/80 - 4/27/81 (6)	Control	82.5	17.8 a	
	Dip N'Grow 1 in 5	86.3	20.2 b	
	Hormex 8	66.3	13.7 a	
	Woods R.C. 1 in 5	66.3	15.8 a	
<i>Ligustrum japonicum</i> 12/4/80 - 2/11/81 (10)	Control	90.8	20.6 b	
	Dip N'Grow 1 in 5	87.5	16.7 a	
	Hormex 8	85.8	19.7 a	
	Woods R.C. 1 in 5	87.5	17.5 a	
<i>Photinia × fraseri</i> 12/4/80 - 3/30/81 (4)	Control	0	0	
	Dip N'Grow 1 in 5	35.0	4.8	N.S.
	Hormex 8	20.0	2.5	N.S.
	Woods R.C. 1 in 5	60.0	12.3	N.S.
<i>Pinus mugo</i> 12/9/80 - 6/2/81 (4)	Control	45.0	8.3	N.S.
	Dip N'Grow 1 in 5	40.0	7.5	N.S.
	Hormex 8	37.5	7.5	N.S.
	Woods R.C. 1 in 5	42.5	9.5	N.S.
<i>Thuja occidentalis</i> 'Fastigiata' 12/9/80 - 2/9/81 (10)	Control	52.0	5.8 a	
	Dip N'Grow 1 in 5	84.0	16.0 b	
	Hormex 8	67.0	7.6 a	
	Woods R.C. 1 in 5	79.0	13.3 b	
<i>Viburnum davidii</i> 12/3/80 - 1/29/81 (10)	Control	77.0	10.9 a	
	Dip N'Grow 1 in 5	92.0	23.2 c	
	Hormex 8	93.0	16.0 b	
	Woods R.C. 1 in 5	90.0	22.8 c	

* See text for explanation of rating scales

** Means followed by the same letters are not significantly different at 5% level of the Duncan's Multiple Range Test.

*** Old formulation

Table 2. Effect of several hormone products on the rooting of softwood cuttings of two species.

Species, Rooting Period, and Number of Replications()	Treatment	Percent of Cuttings Rooted	Average Rooting Value*	
<i>Forsythia</i> × <i>intermedia</i> 'Spring Glory' 5/14/81 - 6/1/81 (4)	Control	90.0%	19.0	N S **
	Dip N'Grow 1 in 10	97.5	20.5	N.S.
	Dip N'Grow 1 in 20	80.0	16.3	N.S.
	Dip N'Grow 1 in 40	97.5	24.0	N.S.
	Dip N'Grow 1 in 20	97.5	20.5	N.S.
	Old formulation			
	Woods R.C 1 in 10	97.5	22.5	N.S.
	Woods R.C 1 in 20	97.5	23.0	N.S.
	Woods R.C. 1 in 40	92.5	22.5	N S
	Hormodin 2	100.0	24.8	N.S.
<i>Viburnum</i> × <i>burkwoodii</i> 5/13/81 - 6/16/81 (4)	Control	82.5	14.0 a	
	Dip N'Grow 1 in 10	97.5	28.3 b	
	Dip N'Grow 1 in 20	75.0	16.3 a	
	Dip N'Grow 1 in 40	90.0	15.5 a	
	Dip N'Grow 1 in 20	97.5	26.3 b	
	Old formulation			
	Woods R C 1 in 10	97.5	27.0 b	
	Woods R.C. 1 in 20	100.0	26.0 b	
	Woods R C 1 in 40	100.0	24.0 b	
	Hormodin 2	90.0	17.3 a	

* See text for explanation of rating scales.

** Means followed by the same letters are not significantly different at 5% level of the Duncans Multiple Range Test.

PROPAGATION OF ALASKA YELLOW CEDAR (*CHAMAECYPARIS NOOTKATENSIS* [D. DON] SPACH.) BY ROOTED CUTTINGS FOR PRODUCTION PLANTING

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Abstract. Rooted cuttings of yellow cedar from young material reached a plantable size in one growing season. Two and four years after planting on typical sites, survival and height growth of the cuttings compared favorably to those of the seedlings. A hedging orchard was established from seed of selected parent trees in order to produce juvenile material for the large scale production of rooted cuttings and, in 1981, the first production of rooted cuttings for reforestation was begun.

An increase in high-elevation logging activities in the Coastal Forest Regions of British Columbia has focused attention on the use of "minor" species for reforestation. Yellow cedar is an important and valuable component of certain ecosystems at these high elevations. Unfortunately, the seedling requirement for the reforestation of this species cannot be met by the nurseries because of the shortage of cones and poor